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EXAMINER	
SLAWSKI, MAGALI P	
ART UNIT	PAPER NUMBER
1728	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,971	SKRYABIN, IGOR LVOVICH	
	Examiner	Art Unit	
	Magali P. Slawski	1728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 September 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *102-132* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *122-123* is/are allowed.

6)☒ Claim(s) *102-120 and 124-132* is/are rejected.

7)☒ Claim(s) *121* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's amendment filed September 27, 2010 was received.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

Claims 102-103, 105-106, 110 and 130 are rejected under 35 U.S.C. 103(a) as being unpatentable over Simburger (US 6,127,621), henceforth **Simburger 621**, in view of **Ellion** (US 4,710,588).

Regarding **claim 102**, Simburger 621 teaches a photovoltaic device (power sphere, title) including plural layers of film (thin film flexible solar cells, 3:65, figure 1:12a) formed on a curved surface (figure 1:11). The photovoltaic element of the device is made up of the solar cells (figure 1:12a), which define a spherical space within.

Since Simburger 621 does not a curved envelope with the film layers on its inner surface. However, Simburger 621's power sphere is a space satellite (1:35-36) and Ellion teaches that solar cells destined for space travel are typically covered with glass in order to shield them from physical or radiation damage (1:68-2:4). Therefore, it would have been obvious to one of ordinary skill in the art to cover the film layer solar cells taught by Simburger 621 with an envelope because Ellion teaches covering space solar cells in order to protect them. Since Simburger 621 teaches that the flexible solar cells conform to the power sphere's curved surface (3:22-25), it would have been obvious to

one of ordinary skill in the art to make curved any envelope covering the cells either continuously or discretely.

Regarding **claim 103**, any contiguous half of Simburger 621's solar cell array forms a dome. For example, a dome is shown in figure 1. Based on the reasoning provided in the rejection of claim 102, the portion of the envelope surrounding that half of the solar cells would also be a dome.

Regarding **claim 105**, based on the reasoning provided in the rejection of claim 102, the envelope would be spherical. Simburger 621 does not teach an embodiment with a radius less than 30 mm. However, it would have been obvious to one of ordinary skill in the art to make the power sphere as small as necessary depending on the needs of the application. For example, one might have made it smaller for the sake of stealth or to make it lighter. A change in size alone does not make a claimed invention patentable over the prior art (cf. MPEP 2144.04 IV A).

Regarding **claim 110**, Simburger 621's power sphere includes an energy storage device (lithium ion battery, 8:46-47).

Regarding **claim 126**, Simburger 621's photovoltaic elements are thin film solar cells (3:65).

Regarding **claim 130**, Simburger 621's power sphere contains two-millimeter polyamide film (8:64-65), which both secures the solar cells and provides mechanical rigidity.

Claim 106 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion** as applied to claim 102 above, and further in view of Simburger et al. (US 6,284,966), henceforth **Simburger 966**.

Simburger 621 teaches a group of electronic parts which are directly or indirectly connected to the solar cells (all the devices shown in figure 2). Any one of those parts or sets of those parts can be the electronic apparatus. While Simburger 621 specifically teaches that electric (current) power from the solar cells is supplied to the regulated bus (1:61-63), it would have been obvious to one of ordinary skill in the art to see that all the electronic parts of the power sphere which require power were supplied by either directly or indirectly by the solar cells because solar cells' *raison d'être* is to supply power and solar power is the most reliable power available in space.

Simburger 621 does not positively teach that any of these electronic devices is *within* the sphere. However, Simburger 966, which is related to Simburger 621 (Simburger 966, 1:9-11), teaches placing the payload inside the sphere (2:47, figure 4). One advantage to placing the payload inside the sphere is that the sphere protects the payload from sudden changes in temperature (2:65-3:2). Therefore it would have been obvious to one of ordinary skill in the art to place the electronic devices taught by Simburger 621 within the sphere because Simburger 966 teaches placing the payload within the sphere for thermal isolation.

Claims 107-109 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Simburger 966** as applied to claim 106 above, and further in view of Knoblach et al. (US 2002/0072361 A1), henceforth **Knoblach**.

Regarding **claim 107**, Simburger 621 does not teach a transmitter. However, Simburger 621's solar cell array is part of a communications satellite (1:35-36, 2:57-58). A communications satellite typically uses a transmitter to send inform back to Earth. For example, Knoblach teaches a communications satellite (0001) that uses a transmitter (0063 middle) to send information from the satellite. Therefore, it would have been have been obvious to include an information transmitter in the electronic apparatus taught by Simburger 621 in order to make the apparatus functional as a communications satellite. Alternatively, it would have been obvious to one of ordinary skill in the art to combine an information transmitter with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Regarding **claims 108-109**, Simburger 621 does not teach an antenna. However, Simburger 621's solar cell array is part of a communications satellite (1:35-36, 2:57-58). A communications satellite typically includes an antenna to facilitate communication. For example, y teaches a spherical communications satellite with an antenna (figure 1:22) that is formed by a region of the spherical envelope (figure 1:10) and projects outwardly therefrom. An antenna is inherently conductive because, in order to function as an antenna in this context, it must conduct either electrons or signals. Therefore, it would have been obvious to one of ordinary skill in the art to

include an antenna as claimed in the apparatus taught by Simburger 621 in order to enable the communications satellite to function as such. Alternatively, it would have been obvious to one of ordinary skill in the art to combine an antenna as claimed with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Regarding **claim 112**, Simburger 621 does not teach a sensor. However, Simburger 621's solar cell array is part of a communications satellite (1:35-36, 2:57-58). A communications satellite requires sensors to receive information from its remote environment and from its ground control center. For example, Knoblach teaches a communications satellite with multiple sensors: sensors to regulate the satellite's function (battery temperature sensor, payload temperature sensor, attitude sensor, 0066 bottom) and sensors to collect information that will be sent back to Earth (meteorological sensors, 0070 bottom of page 10). Sensors help the satellite function and achieve its communications mission. Therefore, it would have been obvious to incorporate a sensor into the apparatus of Simburger 621 in order to enable the communications satellite to function as such.

Simburger 621 does not teach an embodiment with a radius less than 10 mm. However, it would have been obvious to one of ordinary skill in the art to make the power sphere as small as necessary depending on the needs of the application. For example, one might have made it smaller for the sake of stealth or to make it lighter. A change in size alone does not make a claimed invention patentable over the prior art (cf. MPEP 2144.04 IV A).

Regarding **claim 113**, the reasons for including a sensor are given in the rejection of claim 112. Simburger 621 does not provide a reason for having the sensor extend outside the envelope. However, as Knoblach teaches, communications satellites can be used to collect information about their local environment. Knoblach's satellite collects weather information (ambient temperature, ambient pressure, ambient humidity, 0070 bottom of page 10) using a meteorological package (figure 10:82). In order to gather this information, the sensing device must be exposed to the external environment. It would have been obvious to one of ordinary skill in the art to situate a sensor on any satellite on its outside so that the sensor might collect information about the external environment. Therefore, it would have been obvious to one of ordinary skill in the art to have the sensor in Simburger 621's apparatus extend outwardly from the envelope so that it might collect information from outside the envelope.

Regarding **claim 114**, Applicant has claimed that the device is in the form of a mote. Since "mote" is not a word commonly used in the solar cell art, the examiner has relied on Applicant's specification to define "mote." According to Applicant, a mote is a miniature wireless sensor [0017] comprising a sensor [0019], a data processor [0020], a transmitter [0021], a receiver [0022] and a power source that includes an energy store and a photovoltaic element [0023].

Simburger 621 teaches a miniature wireless device (microsatellite or nanosatellite, 1:26) comprising a power source that includes an energy store (lithium ion battery, 8:46-47) and a photovoltaic element (crystalline or thin film flexible solar cells, 3:65).

Simburger 621 does not positively teach a sensor. However, Simburger 621's invention is part of a communications satellite (1:35-36, 2:57-58). A communications satellite requires sensors to receive information from its remote environment and from its ground control center. For example, Knoblach teaches a communications satellite with multiple sensors: sensors to regulate the satellite's function (battery temperature sensor, payload temperature sensor, attitude sensor, 0066 bottom) and sensors to collect information that will be sent back to Earth (meteorological sensors, 0070 bottom of page 10). Sensors help the satellite function and achieve its communications mission. Therefore, it would have been obvious to incorporate a sensor into the apparatus of Simburger 621 in order to enable the communications satellite to function as such.

Simburger 621 does not positively teach a data processor, a transmitter or a receiver. However, these are essential parts of a communications satellite. Transmitters and receivers make the communication possible and a data processor is required to translate the signals into information and vice versa. The data processor is also needed to regulate functions within the satellite. Knoblach teaches a data processor, a transmitter and a receiver [0063] as key components of a functional communications satellite. Therefore it would have been obvious to one of ordinary skill in the art to incorporate these elements into the apparatus taught by Simburger 621 in order to make it work as a communications satellite.

Regarding **claim 115**, Simburger 621 teaches an embodiment in which the power sphere is enclosed by in a thin film laminate that, when stressed, possesses plasticity (9:27-31). This thin film laminate is a resilient cover.

Regarding **claim 116**, Simburger 621's spherical shape (title) is aerodynamic.

Claim 111 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion** and **Knoblach** as applied to claim 110 above, and further in view of **Nazri** (US 5,826,743).

Regarding **claim 111**, Simburger 621's energy storage device is at the center of the power sphere (8:49-50), the center being proximate to the solar cells. Simburger 621 does not teach that the energy storage device is made of thin layers. However, Simburger 621's invention is related to micro- and nanosatellites (1:26) and Simburger 621 teaches using a lithium ion battery as an energy storage device (8:46-47). Nazri teaches making a lithium ion battery (title, 2:7) made of thin layers for situations where miniaturization is important (thin film, 2:2-26, figure 1). Therefore it would have been obvious to one of ordinary skill in the art to use an energy device made of thin layers in the apparatus taught by Simburger 621 because said apparatus is small and Nazri teaches making thin-layer batteries for miniature applications.

Claims 117-118 and 120 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion** and **Knoblach** as applied to claim 114 above, and further in view of **Skov** (US 3,258,223).

Regarding **claim 117**, Simburger does not teach a means for orienting the photovoltaic device. However, Simburger 621's photovoltaic device is a satellite. Skov teaches that, for certain applications, such as reconnaissance, surveillance and communications, it is important that an artificial satellite be oriented in a particular direction with respect to the center of its orbit (1:17-26). Therefore it would have been obvious to one of ordinary skill in the art to include a means for orienting the photovoltaic satellite taught by Simburger 621 because Skov teaches that attitude control is important for the satellite to accomplish its mission.

Regarding **claim 118**, Skov offers an effective orienting means a system that involves at least two centers of gravity: the centers of gravity of the spherical weights (figure 1:12 and 14) and the center of gravity of the satellite itself (2:31-32). Therefore it would have been obvious to one of ordinary skill in the art to incorporate an orienting means that includes a predetermined center of gravity of Simburger 621's photovoltaic power sphere with the structures already taught by Simburger 621 in order to predictably and successfully orient the satellite.

Regarding **claim 120**, Skov's conducting masses are located as far from the satellite's center of gravity as is practicable (2:31-32). The masses (figure 1:12 and 14) are pressed by electrical forces against the interior of an outer shell of the satellite. The portion of each mass that is pressed against this shell sticks to or adheres to the shell, which makes that portion an adhesive portion. While the surface to which the mass sticks is not the outer*most* surface, it is an outer surface of the device because it is a surface of the outermost layer of the device.

Claims 118-119 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion**, **Knoblach** and **Skov** as applied to claim 117 above, and further in view of **Etkin** (US 3,268,183).

Regarding **claim 118**, as explained in the rejection of claim 117, Skov provides a rationale for using an orienting means. First, Etkin teaches an effective orienting means that uses a gravity gradient (1:29-30). The use of a gravity gradient inherently requires that there be a predetermined center of gravity of the device. Second, Etkin also exploits the center of gravity of a weight (figure 3:58) attached to the satellite. Therefore it would have been obvious to one of ordinary skill in the art to combine an orienting means that includes a predetermined center of gravity with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Regarding **claim 119**, Etkin teaches an effective orienting means that includes plural rods (figure 1:12-17) projecting outwardly from the satellite body. One advantage of the outward projection is that it enables the stabilizing rods to double as antennae (2:18-19). Therefore, it would have been obvious to one of ordinary skill in the art to have the orienting means project outwardly from Simburger 621's photovoltaic power sphere because Etkin teaches doing so to use the means as antennae. *Alternatively*, it would have been obvious to one of ordinary skill in the art to combine an outwardly projecting orienting means with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Claims 127-129 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion** as applied to claim 126 above, and further in view of Ikeda et al. (WO 03/005,481), henceforth **Ikeda**. All references to Ikeda are to its English language equivalent, US 2004/0187918 A1.

Regarding **claim 127**, Simburger 621 does not teach dye solar cells (DSCs). However, Ikeda teaches that dye solar cells are efficient at energy conversion and can be made inexpensively (page 1 paragraph 0003). Therefore it would have been obvious to one of ordinary skill in the art to incorporate DSCs in the apparatus taught by Simburger 621 because Ikeda teaches that are efficient and can be made cheaply. *Alternatively*, it would have been obvious to one of ordinary skill in the art to combine DSCs with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Regarding **claim 128**, Simburger 621 does not teach an electrode that comprises carbon. However, Ikeda teaches using a carbon counter electrode because carbon is conductive and catalyzes the reduction of the redox electrolyte (page 51 paragraph 0385 second half). Therefore, it would have been obvious to incorporate a carbon electrode into the apparatus taught by Simburger 621 because Ikeda teaches that carbon conducts electrons and catalyzes the redox reaction. Alternatively, it would have been obvious to one of ordinary skill in the art to combine a carbon electrode with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success. The electrode in Simburger 621's solar cells would

be internal because the cells, based on the reasoning explained in the rejection of claim 1, are inside the envelope.

Simburger 621 does not teach an embodiment with a radius less than 5 mm. However, it would have been obvious to one of ordinary skill in the art to make the power sphere as small as necessary depending on the needs of the application. For example, one might have made it smaller for the sake of stealth or to make it lighter. A change in size alone does not make a claimed invention patentable over the prior art (cf. MPEP 2144.04 IV A).

Regarding **claim 129**, Ikeda teaches a semiconductor thin film (page 50 paragraph 0373), a redox electrolyte, and an electrode (page 51 paragraph 0385). The electrolyte resides between the thin film and the electrode. The space between the thin film and the electrode is a reservoir.

Regarding **claim 132**, Simburger 621 teaches a photovoltaic device (power sphere, title) including plural layers of film (thin film flexible solar cells, 3:65, figure 1:12a) formed on a curved surface (figure 1:11). The photovoltaic element of the device is made up of the solar cells (figure 1:12a), which define a spherical space within.

Simburger 621 does not teach an embodiment with a radius less than 30 mm. However, it would have been obvious to one of ordinary skill in the art to make the power sphere as small as necessary depending on the needs of the application. For example, one might have made it smaller for the sake of stealth or to make it lighter. A change in size alone does not make a claimed invention patentable over the prior art (cf. MPEP 2144.04 IV A).

Simburger 621 does not teach a curved envelope with the film layers on its inner surface. However, Simburger 621's power sphere is a space satellite (1:35-36) and Ellion teaches that solar cells destined for space travel are typically covered with glass in order to shield them from physical or radiation damage (1:68-2:4). Therefore, it would have been obvious to one of ordinary skill in the art to cover the film layer solar cells taught by Simburger 621 with an envelope because Ellion teaches covering space solar cells in order to protect them. Since Simburger 621 teaches that the flexible solar cells conform to the power sphere's curved surface (3:22-25), it would have been obvious to one of ordinary skill in the art to make curved any envelope covering the cells either continuously or discretely.

Applicant has claimed an electronic block within the space defined by the photovoltaic layers. In the absence of a special definition for "electronic block," the examiner has interpreted this phrase in two ways compatible with its uses in the art. First, an electronic block can be the assembly of circuits in an electrical system. Simburger 621 teaches a power distribution system (figure 2), power regulators (figure 3) and a storage device charger (figure 4), all of which comprise circuits. Though Simburger 621 does not explicitly state that these reside inside the power sphere, it would have been obvious to one of the art to place them inside--rather than outside--the power sphere in order to protect them from the exterior environment. Second, an electronic block can be a single device in whose function is electronic. Simburger 621 teaches batteries (4:34), which, for the reason stated above, it would have been obvious to one of ordinary skill in the art to place inside the power sphere.

Allowable Subject Matter

Claim 121 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 121 recites that the photovoltaic device is mounted on and electrically connected to a substrate. Claim 121 depends on claim 102, which has been rejected under Simburger 621. Simburger 621 teaches a self-contained and self-sustaining satellite. Neither Simburger 621 nor the related prior art of record teaches or suggests mounting and electrically connecting a self-sufficient satellite to a substrate.

Claims 122-123 are allowed.

Regarding **claim 122** the reasons for its allowance are provided in the office action mailed March 30, 2010.

Response to Arguments

Applicant's arguments filed September 27, 2010 have been fully considered.

Applicant's arguments with respect to Nakata (US 5,785,768), Mlavsky (US 4,978,944), and Bender (US 3,844,040) have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.

Some of the arguments regarding Simburger 621 were not persuasive.

Applicant argues that, because Simburger 621 teaches a power sphere with a 57 cm diameter, it would not have been obvious to one of ordinary skill in the art to make it smaller. In response to Applicant's argument, A change in size alone does not make a claimed invention patentable over the prior art (cf. MPEP 2144.04 IV A). Furthermore, it is not clear from Applicant's specification that the claimed sizes are critical or produce any special results that would not have been obvious to expect.

Applicant argues that Ellion's teaching of encapsulating solar cells does not read on the cells' being "formed on the interior surface" of the envelope. In response to Applicant's argument, in covering anything with a protective layer, it would have been obvious to one of ordinary skill in the art to place the layer in either direct *or* indirect contact with what is being covered. It would *not* have been obvious to that person to suspend Simburger 621's power sphere in a loose shell without anything to connect them. The examiner's position is based on a plain reading of Ellion in the context of the art.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Magali P. Slawski whose telephone number is (571) 270-3960. The examiner can normally be reached on Monday through Thursday, 9 a.m. to 5 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer K. Michener can be reached on (571) 272-1424. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer K. Michener/
Supervisory Patent Examiner, Art Unit 1728

/Magali P. Slawski/
Examiner, Art Unit 1728